Appendix I

USFWS

Stubbs Pond

Contaminants Review of the Peverly Brook Drainage Area

UNITED STATES GOVERNMENT
MEMORANDUM

U.S. FISH AND WILDLIFE SERVICE
NEW ENGLAND FIELD OFFICE
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TO: Graham Taylor, Refuge Manager,
Parker River National Wildlife Refuge

February 3, 2011

FROM: Thomas Chapman, Supervisor, New England Field Office

SUBJECT: Sampling Review

Attached as you requested is the contaminants review containing data collected as part of the clean-up of the former Pease Air Force Base. This review focuses on the Peverly Brook drainage area located at Great Bay National Wildlife Refuge. I understand that this review will be used as an appendix for the Great Bay Comprehensive Conservation Plan.

If you have any questions, please contact Mr. Drew Major of this office at 603-223-2541.

Attachment

Introduction

This is a retrospective review of sampling plans and data compiled as part of the clean-up of the former Pease Air Force Base. This review focuses on the Peverly Brook drainage area located at Great Bay National Wildlife Refuge (maps I-1 and I-2). Below is a summary of the major points of each of the plans and data reports. Also included is a discussion section which describes key findings and trends, explains current sources of contamination, and suggests further sampling.

Summary of Important Points of Sampling Reports and Data

Basewide Surface Water, Sediment, and Fish Tissue Monitoring (United States Air Force 1998)

This report documents sample sites, analytes, and sampling frequency for monitoring. This document also states the cleanup goals and is a useful reference document for interpreting monitoring results.

Long-Term Monitoring Sampling and Analysis Plan (United States Air Force 1999)

This plan details the field protocols that were used during the subsequent site monitoring and sample collection. It is also a useful reference document for interpreting monitoring results.

Draft Fieldwork Notification Biota Sampling: Pease Air Force Base (Watson 2001)

This report details the objectives, methods, and analysis of the 2001 fish collection. It is also useful as a reference document for interpreting monitoring results.

Basewide Surface Water, Sediment, and Fish Tissue Monitoring (Bechtel 1999)

This review is limited to drainage area G (Peverly Brook).

Peverly Brook and Upper Peverly Pond

- *Surface Water* - Surface water samples exceeded cleanup goals for arsenic (As), iron (Fe), and lead (Pb). Landfill-1 may be contributing metals to Upper Peverly Pond.
- *Sediment* - Sediment samples exceeded cleanup goals for arsenic, lead, nickel (Ni), and zinc (Zn). Time series plots indicate an increasing concentration trend in Upper Peverly Pond.

Lower Peverly and Stubbs Pond

- *Surface Water* - Surface water samples exceeded cleanup goals for arsenic.
- *Sediment* - All sediment samples met cleanup goals. Time series plots indicate an increasing concentration trend in Stubbs Pond and a decreasing trend in Lower Peverly Pond.

No fish tissue monitoring was required for the time period covered by this report. Since pesticide/PCB (polychlorinated biphenyl) levels were low, the author recommended that water and sediment samples not be analyzed for these constituents in the future.

Basewide Surface Water, Sediment, and Fish Tissue Monitoring (MWH Americas 2002)

This review is limited to drainage area G (Peverly Brook).

Peverly Brook and Upper Peverly Pond

- *Surface Water* - Iron levels exceeded the cleanup goal at four different sampling stations between the years 1993-2001. In 2001, only the farthest upstream station exceeded the iron cleanup goal. Pesticide analysis was discontinued in 2000 because levels were below detection limits.
- *Sediment* - No sediment samples exceeded metals cleanup goals in 2001. The area around Station 8015 (center of Upper Peverly Pond) continues to act as a sediment and metals trap. Pesticides continue to be flushed out of the tributaries and are accumulating in the sediments of Upper Peverly Pond. There are no cleanup goals established for pesticides.

Human and Ecological Health Risk

No human health risk from ingestion of recreationally caught catfish and bass from Stubbs Pond. This is limited ecological risk to belted kingfisher from ingestion of fish from Stubbs Pond from arsenic and zinc.

Fish

The report compared the results of the 2001 sampling event to the 1996 sampling event. Fish were not sampled in Stubbs Pond in 2001 due to insufficient water levels. In Upper Peverly Pond, the highest concentrations of mercury (Hg) (0.42 ppm) and DDE (0.2 ppm) were found in largemouth bass, while the lowest (0.04 and 0.017 ppm respectively) were found in bluegill sunfish. The same relationships were true for Lower Peverly Pond, although the levels were approximately half that found in Upper Peverly Pond fish (i.e., 0.24 ppm mercury and 0.089 ppm DDE in largemouth bass).

The average mercury (Hg) concentrations found in largemouth bass fillets were 0.318 ppm in Upper Peverly Pond and 0.226 ppm in Lower Peverly Pond. These levels are consistent with those found throughout the Region. The U.S. Environmental Protection Agency recommends limiting fish meals to no more than three per month when mercury levels are between 0.23 and 0.31 ppm.

Note: During the review of the document, the Department of the Interior, the U.S. Environmental Protection Agency (EPA), and the New Hampshire Department of Environmental Services (NHDES) requested that fish sampling be conducted in 2006 (especially in Stubbs Pond). The Air Force disagreed and stated "*There is currently no requirement to sample in 2006*

and neither the EPA nor the NHDES has articulated a clear objective for continued fish tissue sampling." There has been no additional fish tissue sampling conducted by the Air Force since 2001.

Stubbs Pond-Peverly Brook Drainage System (Vanasse Hangen Brustlin 2005)

Stubbs Pond is located within Drainage Area G. The largest contributor of contaminants to the Peverly Brook drainage is Zone 2 which includes Landfill 1, Fire Department Training Area 1, Munitions Maintenance Area, Construction Rubble Dump, and the McIntyre Drum Disposal Area. Historic contaminants of concern in the drainage include metals (aluminum [Al], arsenic, iron, lead, manganese [Mn], nickel, and zinc) and pesticides (DDT and metabolites). Landfill 1 was primarily responsible for the metals while historic base-wide use of DDT was responsible for the pesticide levels.

Nineteen sediment samples were collected in December 2004 and submitted for analysis. Chromium (Cr) levels from one sample (SP-10A in the center of the pond) exceeded the probable effect concentration (PEC) as defined by McDonald *et al.* (2000). PEC values are screening thresholds above which adverse effects are likely. When results were compared to NOAA's Screening Quick Reference Tables, arsenic, cadmium (Cd), chromium, nickel, lead, and zinc exceeded the Effects Range-Low in at least one sample, but no samples exceeded the Effects Range-Medium. Concentrations between the Effects Range-Low and Effects Range-Medium are occasionally associated with adverse effects.

Discussion

Upper Peverly Pond has acted as a sediment and heavy metal trap, preventing the majority of the contaminants from migrating farther down the watershed. However, some metals have migrated from Upper Peverly Pond, through the system, and have been deposited into the low flow velocity area of Stubbs Pond. Landfill 1 is the primary source of the metals. The metal levels in Stubbs Pond are relatively low with the exception of sampling sites in the middle of the pond. There was a decline in sediment metal levels in Upper Peverly Pond between 1999-2000. This trend may be continuing as clean sediment has been deposited on top of the contaminated sediment. It would be prudent to resample Upper Peverly Pond sediments to confirm that Landfill 1 is no longer depositing metals into the pond. During any resampling, at least one sample should be taken from the deepest spot in the pond in order to ensure representative sampling.

Levels of mercury and DDE in largemouth bass from Upper Peverly Pond are elevated in relation to the other waterbodies of the Peverly Brook drainage area. Although the level of mercury in largemouth bass (mean of 0.32 ppm) appears to pose a limited risk to piscivorous birds, it is important to note that the size of the bass sampled in Upper Peverly Pond was selected to estimate the risk to human health and not ecological health. In order to properly estimate the risk to piscivorous species that would be expected to use Upper Peverly Pond (such as belted kingfisher, osprey, and bald eagle), sampling of more appropriate size classes would be required. High levels of DDE in feed (10 ppm) can also result in eggshell thinning and have other

reproductive effects in waterfowl. However, it does not appear that DDE levels in Upper Peverly Pond are high enough pose a risk to waterfowl and other piscivorous wildlife.

In addition to existing contaminants from operations at the former Pease Air Force Base, the adjacent Pease International Tradeport is a possible continuing source of contaminates to the Peverly Brook drainage area. These contaminants may include herbicides and de-icing material (propylene glycol). Given the correct equipment and appropriate funding, these contaminants can be detected and monitored.

At the request of the Great Bay Refuge, the New England Field Office can draft a contaminants monitoring plan for the Peverly Brook drainage area. The plan would outline a three-year on-refuge study to monitor water quality and contaminant levels in sediments and fish tissue, as well as to track any changes and trends in contamination levels. However, due to the high cost of contamination monitoring, it may be difficult to guarantee a funding source for the plan's implementation. Potential funding sources would need to be identified and pursued.

Documents Reviewed

The following documents are on file at Great Bay Refuge Headquarters.

Reference Documents

United States Air Force. 1998. Pease Air Force Base Basewide Surface Water, Sediment, and Fish Tissue Monitoring: Long-term Monitoring Plan *prepared by* Bechtel Environmental, Inc. *for* Air Force Base Conversion Agency and Air Force Center for Environmental Excellence, Base Closure Division. April 1998.

United States Air Force. 1999. Pease Air Force Base: Long-Term Monitoring Sampling and Analysis Plan *prepared by* Bechtel Environmental, Inc. *for* Headquarters Air Force Base Conversion Agency and Air Force Center for Environmental Excellence, Base Closure Division. January 1999.

MacDonald D.D., C.G. Ingersoll and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch. Environ. Contam. Toxicol. 39:20-31.

Montgomery Watson. 2001. Draft Fieldwork Notification Biota Sampling: Pease AFB, Portsmouth, N.H. *prepared by* Montgomery Watson *for* Air Force Center for Environmental Excellence, Environmental Restoration Division. August 2001.

Sampling Results

Bechtel Environmental, Inc. 1999. Pease Air Force Base: Basewide Surface Water, Sediment, and Fish Tissue Monitoring Annual Report *prepared by* Bechtel Environmental, Inc. *for* Air Force Base Conversion Agency and Air Force Center for Environmental Excellence, Base Closure Division. November 1999.

MWH Americas, Inc. 2002. Basewide Surface Water, Sediment, and Fish Tissue Monitoring. Pease AFB, Portsmouth, N.H. *prepared by* MWH Americas, Inc. *for* Air Force Center for Environmental Excellence, Environmental Restoration Division. June 2002.

Vanasse Hangen Brustlin, Inc. 2005. Stubbs Pond-Peverly Brook Drainage System (Formerly Known as Bass Pond), Great Bay National Wildlife Refuge, Newington, New Hampshire *prepared by* Vanasse Hangen Brustlin, Inc. *for* Department of Environmental Services, New Hampshire Coastal Program.

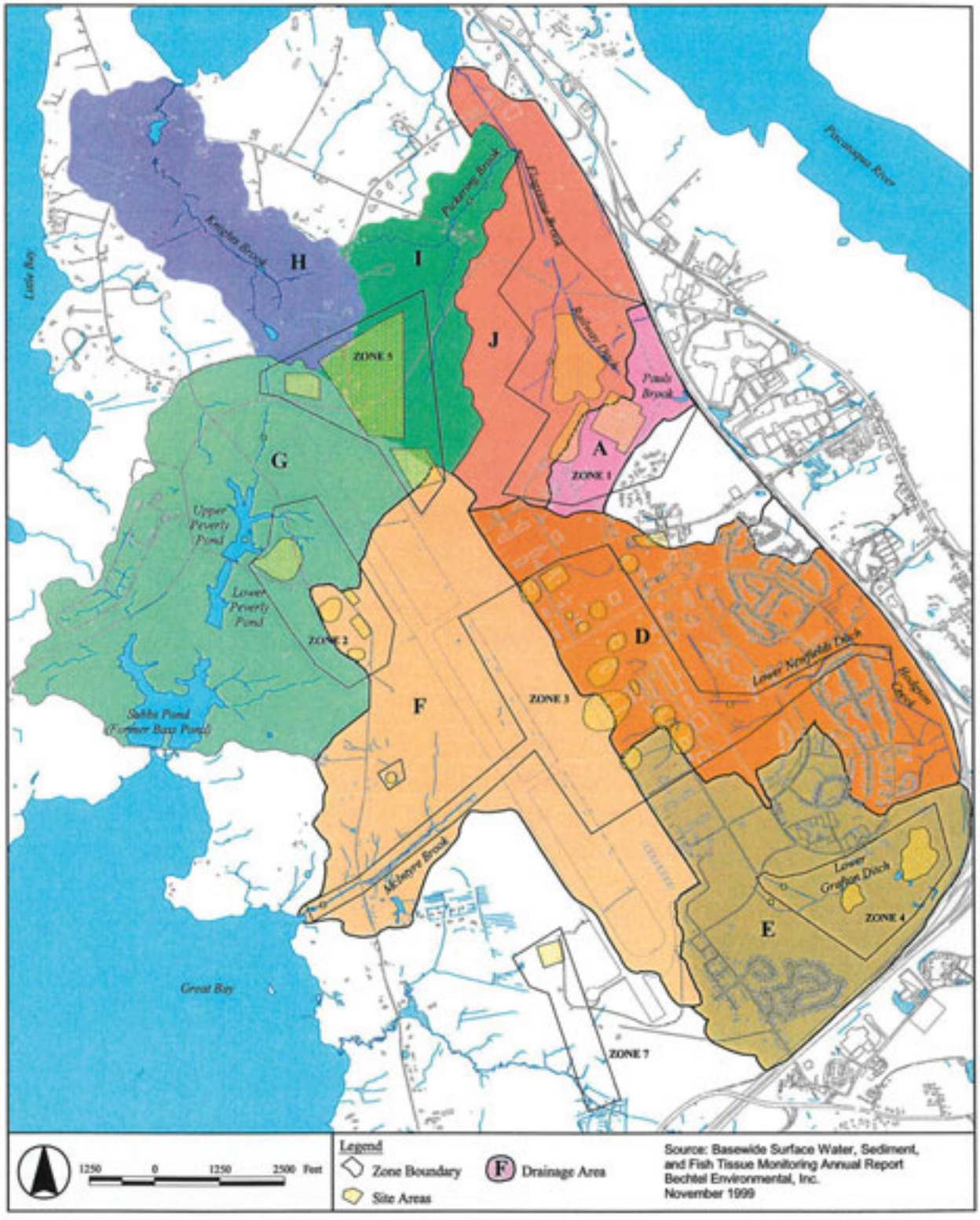

Figure 1-2
Drainage Areas and Associated Sites
Pease Air Force Base, New Hampshire

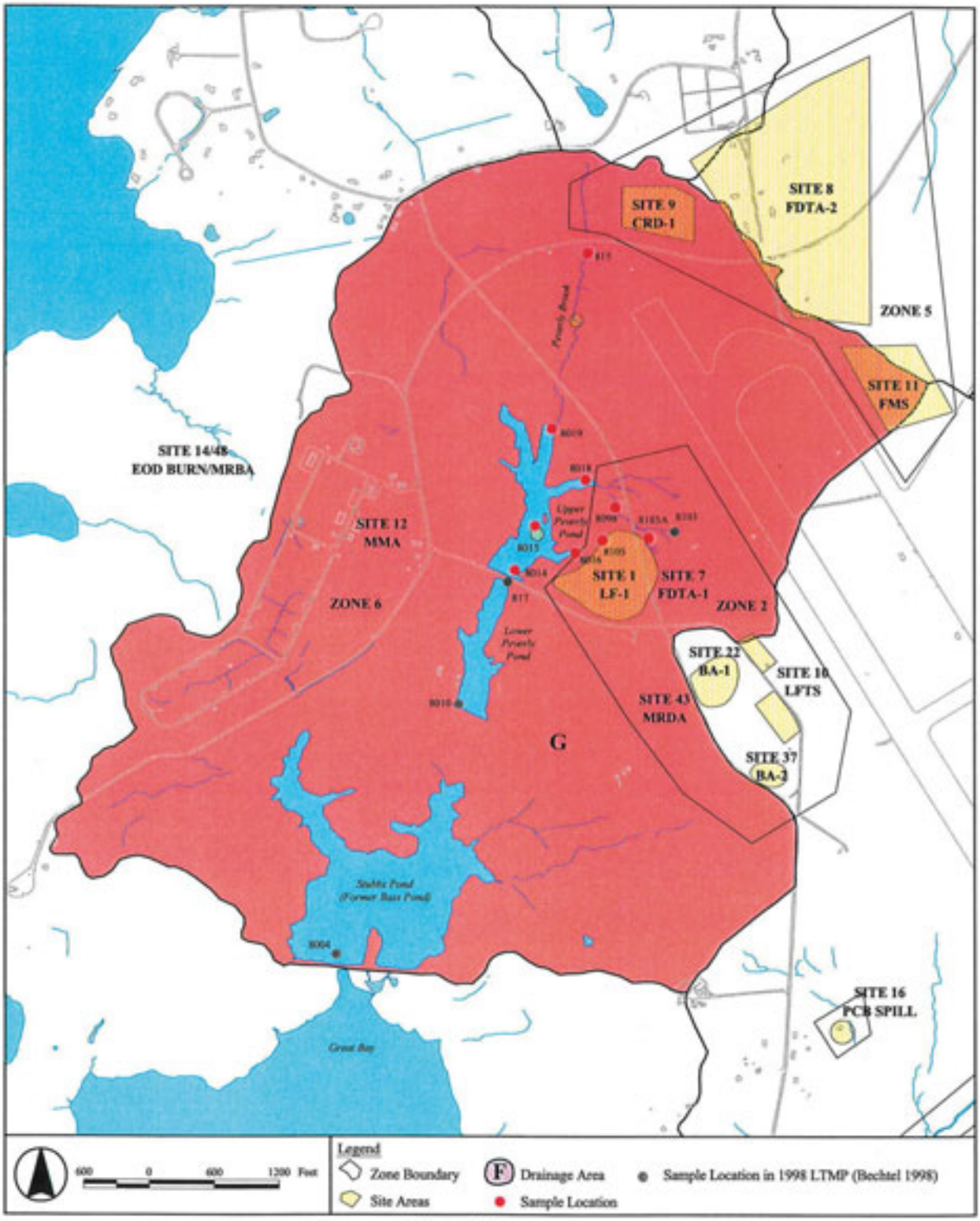

Figure 5-1
Drainage Area G
Pease Air Force Base, New Hampshire